



DEPARTMENT OF TRANSPORTATION

Federal Motor Carrier Safety Administration

[Docket No. FMCSA- 2023-0098]

Agency Information Collection Activities; New Information Collection: Safety Impacts of Human-Automated Driving System (ADS) Team Driving Applications

AGENCY: Federal Motor Carrier Safety Administration (FMCSA), Department of Transportation (DOT).

ACTION: Notice and request for comments.

SUMMARY: In accordance with the Paperwork Reduction Act of 1995, FMCSA announces its plan to submit the Information Collection Request (ICR) described below to the Office of Management and Budget (OMB) for its review and approval and invites public comment. This notice invites comments on a proposed information collection titled “Safety Impacts of Human-Automated Driving System (ADS) Team Driving Applications.” It is a driving simulator study with a series of questionnaires that will quantify the safety implications of team driving applications between humans and ADS-equipped commercial motor vehicles (CMVs). Specifically, this study will focus on team driving applications with an SAE Level 4 (L4) CMV. In L4 automation, as specified by SAE (2021), CMVs are capable of all functions and controls necessary for driving without human monitoring in limited conditions, and the human driver will not be asked to take over control of the vehicle. The L4 CMV will not operate outside of the conditions it was designed for without human control. Approximately 80 CMV drivers will participate in the study. The study will assess the safety benefits and disbenefits of human-ADS team driving applications and support the analysis of potential requests for relief from FMCSA’s hours-of-service (HOS) regulations.

DATES: Comments on this notice must be received on or before [Insert date 60 days after date of publication in the FEDERAL REGISTER].

ADDRESSES: You may submit comments identified by Federal Docket Management System (FDMS) Docket Number FMCSA-2023-0098 using any of the following methods:

- Federal eRulemaking Portal: <https://www.regulations.gov>. Follow the online instructions for submitting comments.
- Fax: 202-493-2251.
- Mail: Dockets Operations; U.S. Department of Transportation, 1200 New Jersey Avenue SE, West Building, Ground Floor, Room W12-140, Washington, DC 20590-0001.
- Hand Delivery or Courier: U.S. Department of Transportation, 1200 New Jersey Avenue SE, West Building, Ground Floor, Room W12-140, Washington, DC, 20590-0001 between 9 a.m. and 5 p.m. ET, Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Brian Routhier, Office of Research and Registration, DOT, FMCSA, West Building 6th Floor, 1200 New Jersey Avenue SE, Washington, DC 20590-0001; 202-366-1225; brian.routhier@dot.gov.

SUPPLEMENTARY INFORMATION:

Public Participation:

Instructions: All submissions must include the Agency name and docket number. For detailed instructions on submitting comments, see the Public Participation heading below.

Note that all comments received will be posted without change to

<https://www.regulations.gov>, including any personal information provided. Please see the Privacy Act heading below.

Docket: For access to the docket to read background documents or comments received, go to <https://www.regulations.gov>, and follow the online instructions for accessing the docket, or go to the street address listed above.

Privacy Act: In accordance with 5 U.S.C. 553(c), DOT solicits comments from the public to better inform its rulemaking process. DOT posts these comments, without edit, including any personal information the commenter provides, to www.regulations.gov, as described in the system of records notice (DOT/ALL-14 FDMS), which can be reviewed at www.dot.gov/privacy.

Public Participation: The Federal eRulemaking Portal is available 24 hours each day, 365 days each year. You can obtain electronic submission and retrieval help and guidelines under the “FAQ” section of the Federal eRulemaking Portal website. If you want us to notify you that we received your comments, please include a self-addressed, stamped envelope or postcard, or print the acknowledgement page that appears after submitting comments online. Comments received after the comment closing date will be included in the docket and will be considered to the extent practicable.

Background:

Over the past 15 years, ADS technology has advanced rapidly through innovation. As more manufacturers and technology companies move toward higher levels of automation (i.e., SAE “L4”), it is not fully clear how human drivers will team with ADS-equipped trucks. L4 ADS-equipped CMVs are capable of all functions and controls necessary for driving without human monitoring in limited conditions, and the human driver will not be asked to take over control of the vehicle. L4 ADS will not operate outside of the conditions for which it was designed. Currently, there are at least four use cases where a human may team with an ADS-equipped CMV:

1. In-vehicle driver teams with an ADS CMV;
2. In-vehicle driver teams with a following ADS-equipped CMV;

3. In-vehicle driver teams with a remote human to monitor and control an ADS CMV; and
4. Remote monitor/operator teaming with ADS CMV.

Each of the teaming use cases above offers different potential human factors benefits and challenges. However, it is unclear how each human-ADS teaming use case will affect safety, productivity, and efficiency. Each teaming combination may positively or negatively affect a driver's cognitive workload and level of fatigue, alertness, or distraction compared to the case of a traditional driver in a truck without ADS. For example, the in-vehicle drivers and remote monitors/operators in the above teaming use cases may experience varying workloads and differences in the development of fatigue.

Previous research conducted by FMCSA found a paucity of extant research related to ADS-equipped CMVs. To date, most commercial ADSs on U.S. roadways are in passenger vehicles, and CMV ADSs are only recently being implemented in real-world operations. Therefore, FMCSA needs more data on ADS-equipped CMVs to understand the human factors surrounding team driving applications between humans and ADS-equipped CMVs.

The purpose for obtaining data in this study is to quantify safety implications of the four human-ADS teaming use cases described above. Specifically, this project will provide data to assess the safety benefits and disbenefits on human-ADS teaming scenarios: (i) driver use, workload, fatigue, alertness, and distraction when teaming with an ADS; (ii) remote operator use, workload, fatigue, alertness, and distraction while actively monitoring and/or controlling an ADS-equipped truck; (iii) driver re-engagement to the driving task after ADS or remote operator control; and (iv) fleet acceptance and future integration possibilities. Additionally, data from this study will support the analysis of potential requests for relief from FMCSA's HOS regulations under 49 U.S.C. 31315 and 49 CFR

part 381. Answers to these research questions will provide insight into the potential safety implications and human factors associated with human-ADS team driving applications.

The study includes data collection from a series of questionnaires and a driving-simulator focused experiment. The collected survey data will support the simulator experiment data. The survey data will be used in two ways: in the assessment of driving performance data as covariates in the model (to control for certain demographic variables, such as age, gender, and experience) and to answer research questions on the human factors and the relationship the safety benefits of each of the four human-ADS team driving applications. Data on workload, fatigue, alertness, inattention, and performance will be collected from the simulator experiment. Eligible drivers will hold a valid commercial driver's license, currently drive a CMV, be 21 years of age or older, and pass the motion sickness history screening questionnaire.

We anticipate 80 participants in total for the driving simulator study. Data will be collected over one study session lasting up to 17 hours. Questionnaire data will be collected prior to the simulator study, during the simulator study, and after the simulator study. All questionnaires will be preloaded in an app format for drivers to complete on a tablet.

The analysis methodology uses a multifaceted approach to address research questions on driver workload, fatigue, alertness, distraction, and rate of safety-critical events. The principal statistical method for analyzing the data will include mixed models to account for multiple, correlated data points from a single participant. Eye-tracking data will be used to assess driver workload, fatigue, alertness, distraction, and reaction time. These data will be described using summary statistics and advanced plotting techniques to visually compare drivers and remote operators during in-vehicle driving, in-vehicle monitoring, and remote operation. A generalized linear mixed model (GLMM) will be used to assess differences in average fatigue, workload, alertness, distraction, and

reaction times between in-vehicle driving and remote operator driving operation types. In the transportation safety field, GLMMs are often used to analyze driver behavior and assess relationships between driving scenarios and behaviors. Finally, rates of safety-critical events, including unintentional lane deviations (which are surrogates for fatigue and alertness) will be analyzed using a Poisson or negative binomial mixed-effect regression model. Poisson or negative binomial regression models are standard practice for the assessment of events over a unit of exposure in the field of transportation safety.

Title: Safety Impacts of Human-Automated Driving System (ADS) Team Driving Applications

OMB Control Number: 2126-00XX.

Type of Request: New ICR

Respondents: CMV drivers

Estimated Number of Respondents: 80

Estimated Time per Response: 17 hours

Expiration Date: This is a new ICR.

Frequency of Response: One response

Estimated Total Annual Burden: 508.5 hours

PUBLIC COMMENTS INVITED: You are asked to comment on any aspect of this information collection, including: (1) whether the proposed collection is necessary for the performance of FMCSA's functions; (2) the accuracy of the estimated burden; (3) ways for FMCSA to enhance the quality, usefulness, and clarity of the collected information; and (4) ways that the burden could be minimized without reducing the quality of the collected information. The Agency will summarize or include your comments in the request for OMB's clearance of this ICR.

Issued under the authority of 49 CFR 1.87.

Thomas P. Keane,
Associate Administrator,
Office of Research and Registration.

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